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NOTES ON TEXAN SNAKES OF THE
GENUS *SALVADORA*

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In drawing up a list of the amphibians and reptiles of the Big Bend region in Trans-Pecos Texas, based on collections made by Tarleton F. Smith for the National Park Service and by a party from Field Museum and the Chicago Academy of Sciences in 1937, I encounter some difficulty with snakes of the genus *Salvadora*. For the study of the problem opened up by the west Texan collections, it has been necessary to borrow additional material. Our thanks are due to authorities of the Museum of Comparative Zoology, the United States National Museum, the Museum of Zoology of the University of Michigan, and the Chicago Academy of Sciences for loans of specimens.

The problem at issue, the identification of the three forms which I discern in Texan collections, has been discussed with C. M. Bogert, who has reviewed the genus *Salvadora* for the United States, and with Hobart M. Smith, who has reviewed the Mexican forms. The divergence of the views in the present paper from those of Dr. Bogert apparently rests on the study of our new material from Trans-Pecos Texas. Without undertaking a revision of the genus, it is desired to formulate this divergence of opinion and bring the new arrangement proposed to the attention of our herpetological colleagues, especially as Dr. Smith may be expected to reopen the whole problem on the basis of his Mexican collections, made as Walter Rathbone Baker Scholar for the Smithsonian Institution. Dr. Smith (in litt.) agrees with me in rejecting Bogert's treatment of the Texan forms.

Stejneger stated the problem as to the allocation of the names *hexalepis* Cope and *grahamiae* Baird and Girard in his paper on the reptiles of the Huachuca Mountains (1902). Although the type locality of *Salvadora grahamiae* is stated as "Sonora," and hence probably southern Arizona (from Bogert's analysis of Graham's route, in litt.), Stejneger assigns the name also to the southeast Texan form which is abundant at Brownsville. Specimens obtained by Tarleton

Smith and myself in the Chisos Mountains, from the higher forested areas, are in excellent agreement with specimens from the Huachucas and with the type of *grahamiae*. They prove to be readily distinguishable from the Brownsville form. A second species in west Texas from the desert plateaus surrounding the isolated mountain forests proves to be distinguishable from both the Chisos form and that of southeastern Texas; and, though it is directly allied to the Arizonan *hexalepis*, it clearly represents an undescribed form. The name *bairdii* Jan and Sordelli (1860, pl. 3, fig. 2) appears to refer to a form closely allied to the one in southeastern Texas described below as *Salvadora lineata*. I follow the advice of Dr. Smith in reserving the name *bairdii*, at least until the type can be re-examined, for the Mexican form defined in his recent paper (1939, p. 232).

Salvadora grahamiae Baird and Girard.

Salvadora grahamiae Baird and Girard, Cat. N. Amer. Rept., pt. 1, p. 104, 1853

Diagnosis.—A *Salvadora* with edges of rostral only slightly raised; posterior chin shields in contact or narrowly separated; eight upper labials (occasionally nine); ventrals fewer than in *deserticola* and *hexalepis*, and caudals more numerous; caudals more numerous than in *lineata*, from which it is further distinguished by the usual absence of the lateral narrow line and by the broader dorsal light band; no supra-anal keels in adult males.

Remarks.—In the Big Bend region of western Texas this species is represented by a form which appears to be confined to the more humid and timbered upper slopes of the mountains. Our few specimens are insufficient for a detailed comparison with the typical *grahamiae* of the Huachuca Mountains. It seems clear that the Chisos Mountain form is directly allied to that of southern Arizona; and it is believed that *grahamiae* is essentially a relict species with more or less completely isolated populations in the mountains of the Southwest. It is evident that the study of the distribution and variation of these populations represents a most interesting herpetological problem, but one that can scarcely be dealt with until more extensive collections are available.

I am indebted to Dr. Smith for the following manuscript notes on the type of *grahamiae*, U. S. National Museum No. 2081:

“A male specimen. Ventrals 180, anal divided, caudals 97, scale rows 17-17-13; supralabials 9-9, infralabials 9-10; first supralabial separated from posterior section of nasal; second supralabial in contact with loreal on one side; preoculars 3-3; postoculars 2-2; loreal

1-1; temporals 2+3, 2+2, posterior pair of chin shields slightly shorter than anterior, separated medially by two scales along the midgular line. Rostral well developed, with distinct, free lateral edges. Median light stripe three scales wide on anterior two-thirds of body, one and two half scale rows wide on posterior third. Adjacent dark band three scale rows wide on anterior two-thirds of body, one and two half scale rows wide on posterior third. Each scale in these dark bands has the base jet black; the antero-lateral edge of the scales of the two upper rows in the dark bands is white. These white spots are confined to the scales of the median row of the dark

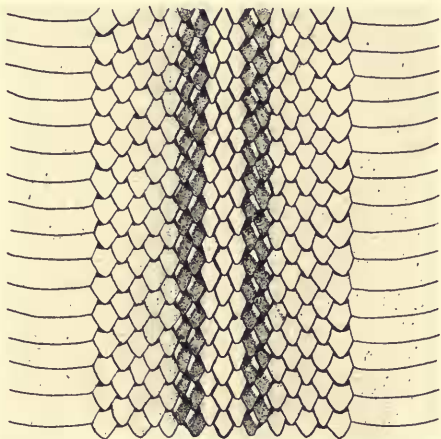


FIG. 13. Pattern of *Salvadora grahamiae* Baird and Girard. Field Museum No. 27720, The Basin, Chisos Mountains, Brewster County, Texas.

stripe on the posterior fourth of the body. No other dark stripes. Total length 690 mm., tail length 184 mm."

The four Huachucan specimens I have examined agree excellently with the type, except for the fact that the upper labials are 8-8 in three and 8-9 in only one. All have dorsal scales 19-17-13, but the drop to 17 takes place at about the twelfth ventral, so that the anterior count is likely to be stated as 17. The ventrals in three males are 180, 181, and 185; 186 in the single female. The corresponding caudals are 107, 107, 97, and 92. Only one specimen agrees with the type in number of preoculars, and this has two on one side and three on the other. A narrow lateral dark line is faint on the third scale row in Field Museum No. 2704, from "Tombstone," collected by F. C. Willard, and hence only presumptively

from the Huachucas. The three remaining specimens agree exactly in coloration with the type (see Baird, 1859, pl. 5, fig. 2).

Four specimens from the Chisos Mountains (two from the Museum of Zoology of the University of Michigan, one in Field Museum and one in the United States National Museum [National Park Service No. 138]) agree in having eight upper labials on each side, no trace of a lateral line, and caudal count high, 101 to 112 (in both sexes). The National Museum specimen, a female, has 197 ventrals, while Field Museum No. 27720, also a female, from the Basin (in the Chisos Mountains), has ventrals 190 and caudals 112; these two specimens agree further in having three preoculars on each side. Differences from the Huachuca series are slight. In the two males and two females available, the ventrals are 179 and 186 in males, 190 and 197 in females; but the caudals are more numerous in females. Should the Chisos and Huachuca populations prove distinguishable as larger series become available, they would still be much more closely allied *inter se* than with any other species of *Salvadora*.

A single male specimen from the Davis Mountains, Field Museum No. 29497, collected by John M. Schmidt in 1938, has ventrals 183, caudals 83, preoculars 3-3, upper labials 9-9, lower labials 11-11, and a faint lateral line on the third scale row. It thus fits neither *hexalepis hexalepis*, *h. deserticola*, *grahamiae*, nor *lineata*. It is best left unidentified until a Davis Mountain series is available. It probably belongs with the mountain *grahamiae* series, as is suggested further by the Tombstone specimen mentioned above and by one in the Chicago Academy of Sciences from Silver City, New Mexico (No. 5247), which agrees with *grahamiae* in ventrals and caudals, but also exhibits a lateral line on the third scale row.

***Salvadora hexalepis deserticola* subsp. nov.**

Type from Government Spring, near Chisos Mountains, Brewster County, Texas. No. 26615 Field Museum of Natural History. Adult male. Collected 1935, by Tom Carney.

Diagnosis.—Allied to *Salvadora hexalepis hexalepis* in the separation of the posterior chin shields, enlargement of the rostral, nine upper labials, in having keeled supra-anal scales, and in pale grayish coloration; distinguished by the uniformly single loreal, lower ventral count, and the situation of the narrow lateral line on the fourth scale row instead of on the third and fourth.

Description of type.—Head a little wider than neck, notably truncate anteriorly on account of the enlarged rostral with its raised edges; body slender, tail alternate.

Portion of rostral seen from above equal to its distance from the frontal; internasals subtriangular, prefrontals nearly rectangular; frontal nearly as long as the parietals, which are truncate posteriorly; upper labials 9–10; lower labials 11–11; anterior chin shields longer than posterior; posterior chin shields separated by two scales; nasal divided; loreal single; oculars 2–2; temporals 2–3; ventrals 190, anal divided, caudals 78; dorsal scales 17–17–13, smooth; faint keels present on the supra-anal region.

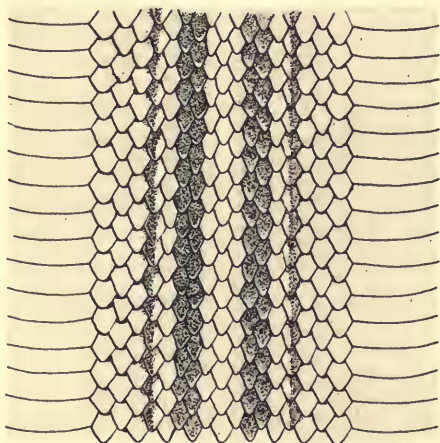


FIG. 14. Pattern of *Salvadora hexalepis deserticola* subsp. nov. Field Museum No. 26615, type.

Light ground color gray, involving the three median scale rows, and parts of the adjacent rows, the three lateral scale rows and the upper half of the fourth and all of the fifth on each side; a dark dorsolateral band on each side on the sixth and seventh scale rows, with a narrow lateral line on the lower half of the fourth scale row; dorsolateral band extending forward to the postoculars; lateral line merged with the dorsolateral band on the neck, on the third scale row on the posterior third of the body.

Measurements of type.—Length 854, tail 189.

Notes on paratypes.—Other specimens in Field Museum collections that are referred to *deserticola* are No. 26620, male, Mesa de Anguilla, Chisos Mountains, collected in 1937 by A. E. Borell; and two females, Nos. 25210 and 27719, collected near the Chisos Mountains by Tarleton F. Smith. Blanchard Collection No. 284 from Hayes Ridge, Chisos Mountains (collected by F. N. Blanchard and Howard K. Gloyd), and University of Michigan No. 66023 from

Glenn Spring, also in the vicinity of the Chisos Mountains, are also females. Ventrals and caudals in the male paratype number 195 and 82; in the female specimens they range from 187 to 190 and from 71 to 79. The loreal is invariably single, the preoculars invariably two; upper labials 9-9 in all but one, which has 10-9; lower labials 10-10 in three, 11-10 in one, 11-11 in one, and 12-12 in one; the postoculars occasionally three; the temporals variable, one to three in the first row and two or three in the second; the posterior chin shields are invariably widely separated. All agree in having the dark lateral line confined to the fourth scale row on the anterior two-thirds of the body.

Remarks.—The subspecies *deserticola* may be associated with the west Texan creosote bush desert. Its relation to the Chisos population of *grahamiae* is evidently the same as that of *hexalepis hexalepis* to the Huachucan *grahamiae*. It may be pointed out that the range of *h. hexalepis* as thus restricted includes two very different vegetational regions, the Sonoran desert of western Arizona to southwestern Utah and Lower California, and the grassy region of southeastern Arizona. *Salvadora hexalepis virgulata* occupies a more uniform faunal area.

Salvadora lineata sp. nov.

Type from Kingsville, Kleberg County, Texas. No. 28605 Field Museum of Natural History. Adult female. Collected 1938, by Professor J. C. Cross.

Diagnosis.—A *Salvadora* with rostral edges little raised, posterior chin shields in contact or narrowly separated, upper labials almost invariably 8-8, lower labials more frequently 9 than 10, ventrals few, 179 to 192 in males, 189 to 194 in females, caudals 90 to 103 in males, 91 to 93 in females. Supra-anal scales not keeled. In most of these characters *lineata* agrees with *grahamiae*; it is sharply distinguished from that form by having a well-defined lateral line, which is on the third scale row anteriorly (the second posteriorly). The anterior section of the nasal is usually in contact with the second labial, and the dorsolateral dark stripe passes over the temporal region to the eye.

Description of type.—Head a little wider than body, body slender, tail attenuate. Snout rounded, edges of rostral slightly raised (worn in type specimen).

Portion of rostral seen from above about equal to the internasal suture, which is nearly as long as the preocular suture; frontal longer than its distance from the end of the snout, about as long as the

parietals, which are truncate posteriorly; upper labials 8-8; lower labials 10-10; nasal divided; loreal single; oculars 2-2; temporals 2-2 and 2-3; ventrals 201, anal divided, caudals 93; dorsal scale rows 19-17-13, smooth.

Dorsal stripe pale yellowish, less than three scale rows wide except on the neck; adjacent dorsolateral dark brown band on the fifth, sixth, seventh, and part of the eighth scale rows, very sharply defined, with light bluish spots on the lower anterior borders of the dark scales; dark band continued forward to the loreal region; sides greenish gray; a narrow dark line on the middle of the third scale row, beginning on the neck about the length of the head behind the

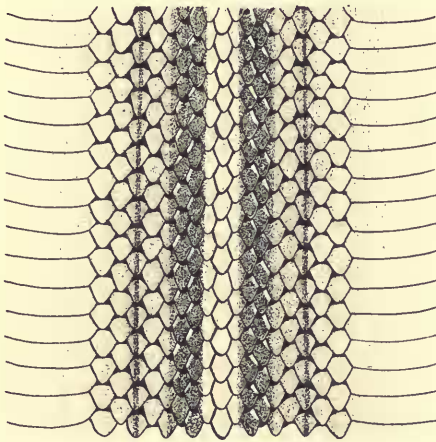


FIG. 15. Pattern of *Salvadora lineata* sp. nov. Field Museum No. 6903, Point Isabel, near Brownsville, Texas.

riectus, continued to the anus; the lateral line is on the third scale row on the posterior third of the body; top of head brown.

Measurements of type.—Length 753, tail 192.

Notes on paratypes.—Twelve male and seven female specimens may be regarded as paratype. Of these Field Museum Nos. 3395, 3395a-c, 5493, 6795-98, Chicago Academy of Sciences No. 5239, and Museum of Comparative Zoology No. 13823 are from Brownsville, Texas; Field Museum No. 6903 is from Point Isabel, near Brownsville; Field Museum No. 25742 is a specimen received through the Lincoln Park Zoo, hence probably from W. A. King, of Brownsville; U. S. National Museum No. 26441 is from Kinney County; Chicago Academy of Sciences No. 5240 is from San Antonio, Bexar County, as is No. 67363 of the National Museum collection; No.

55798, also in the National Museum, is from Waco, McLennan County; and Museum of Comparative Zoology No. 43910 is from Georgetown, Williamson County. A specimen from Ernest G. Marsh (field No. 85) is from Musquiz, Coahuila. This series is remarkably uniform in coloration, and the narrow lateral line is sharply defined on the third scale row in all. The ventrals in twelve males range from $179\frac{1}{2}$ to 192 (average 187), and in eight females (including the type) from 187 to 201 (average 193). The caudals range from 90 to 103 in nine males (average 93), and from 85 to 93 in six females (average 90). The dorsal scale formula is 19-17-15 in six of the female paratypes, while in nine out of twelve males the posterior count is 13; upper labials 8-8 in all but one specimen, lower labials 9-9 in twelve, 10-10 in eight; preoculars 2-2 in thirteen, 1-2 in one, 2-3 in two, 3-3 in four, and 4-3 in one; postoculars 2-3 in one, 3-3 in two, 2-2 in seventeen; temporals variable, 2-2-3 to 3-4-4. The supra-anals are *not* keeled in adult males.

Remarks.—*Salvadora lineata* appears to be abundant in the lower Rio Grande Valley, whence we have fourteen specimens. Musquiz, in the basin of the Rio Alamos, is obviously a normal extension from the Rio Grande Valley. It is clearly this form which is recorded from southeastern Texas by Strecker (1915, p. 36) from Kerr, Kendall, Comal, McLennan, and Matagorda counties.

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